

CLAIMS

1. A method of removing moving objects from a time sequence of images of a region of interest, the method comprising

calculating a median pixel value for each pixel in the image sequence, the image sequence comprising at least a first image and a second image; and

removing moving objects from the image sequence by replacing each pixel value in at least one image of the image sequence with said respective median pixel characteristic value.

2. The method of Claim 1, further comprising the step of storing the image resulting from the removing step as a reference image.

3. The method of Claim 1, further comprising the step of signaling the appearance of an object in the region of interest, by computationally comparing the reference image to at least one additional image to detect differences in the images.

4. The method of Claim 1, further comprising the step of signaling the disappearance of an object in the region of interest, by computationally comparing the reference image to at least one additional image to detect differences in the images.

5. A method of using video images to monitor incidents in a region of interest, comprising the steps of:

    computing a reference image from a set of images by removing moving objects from the set of images;

    storing a motion model representing anticipated motion in the region of interest;

    acquiring a image to be analyzed;

    computing a temporal difference image by comparing the image to be analyzed with the reference image;

    repeating the step of computing a temporal difference image to obtain a set of temporal difference images;

    calculating, from the set of temporal difference images, at least one temporal difference statistic for each pixel;

    detecting motion in a temporal difference image by separating motion pixels from background in the temporal difference image, using the temporal difference statistic, and by grouping motion pixels into motion objects;

    classifying the motion objects by extracting features from the objects; and

    comparing the features of motion objects to the motion model.

6. The method of Claim 5, wherein the step of computing a reference image is performed by calculating a median pixel value for each pixel in an image sequence, the image sequence comprising at least a first image and a second image, and by removing moving objects from the image sequence by replacing each pixel value in at least one image of the image sequence with the median pixel value.

7. The method of Claim 5, wherein the step of computing a reference image is performed by determining a minimum pixel value for each pixel in an image sequence, the image sequence comprising at least a first image and a second image, and by removing moving objects from the image sequence by replacing each pixel value in at least one image of the image sequence with the minimum pixel value.

8. The method of Claim 5, wherein the step of computing a reference image is performed by determining a maximum pixel value for each pixel in an image sequence, the image sequence comprising at least a first image and a second image, and by removing moving objects from the image sequence by replacing each pixel value in at least one image of the image sequence with the maximum pixel value.

9. The method of Claim 5, wherein the step of computing a temporal difference image is performed by subtracting pixel values in the image to be analyzed from pixel values of the reference image.

10. The method of Claim 5, wherein the step of computing a temporal difference image is performed by subtracting pixel values in the reference image from pixel values of the image to be analyzed.

11. The method of Claim 5, wherein the step of computing a temporal difference image is performed by calculating the absolute value of the difference between pixel values in the image to be analyzed and pixel values of the reference image.

12. The method of Claim 5, wherein the temporal difference statistic is an nth percentile statistic.

13. The method of Claim 5, wherein the temporal difference statistic is a mean statistic.

14. The method of Claim 5, wherein the temporal difference statistic is a standard deviation statistic.

15. The method of Claim 5, wherein the step of detecting motion is performed by using the temporal difference statistic of each pixel to determine a threshold and by comparing the temporal difference image with the threshold pixel values.

16. The method of Claim 15, wherein the threshold is based on an nth percentile statistic.

17. The method of Claim 15, wherein the threshold is based on a standard deviation statistic.

18. The method of Claim 5, wherein the classifying step is performed by extracting spatial features.

19. The method of Claim 5, wherein the classifying step is performed by extracting temporal features.

20. The method of Claim 5, wherein the motion model classifies objects as anticipated or not anticipated.

21. The method of Claim 20, wherein the motion model further classifies anticipated objects as being of interest or not of interest.